

CLAIMS

We Claim:

1. A microfluidic device for handling a sample, comprising:
a substrate;
a reaction channel defined on the substrate along which the sample migrates;
a sample channel defined on the substrate from which the sample is introduced into the reaction channel; and
a constricted conduit interface in fluid coupling between the reaction channel and sample channel, through which the sample is injected from the sample channel into the reaction channel.
2. A microfluidic device as in claim 1, wherein the constricted conduit comprises a relatively short and narrow channel in comparison to the sample channel.
3. A microfluidic device as in claim 1, wherein the constricted conduit comprises a constricted opening.
4. A microfluidic device as in claim 1, wherein the constricted opening is in the form of a pinhole.
5. A microfluidic device as in claim 1, wherein the constricted conduit is configured and sized to have at least one of the following characteristics: prevent sample diffusion from the sample channel into the reaction channel, improve structural dimension control in fabrication, and reduce augmented electrophoretic mobility-based bias of sample from the sample channel.
6. A microfluidic device as in claim 1, wherein two ends of the sample channel are in fluid communication with a sample reservoir and a waste reservoir defined on the substrate, respectively.

7. A microfluidic device as in claim 1, wherein the sample channel is in fluid communication with a sample source external of the substrate.

8. A microfluidic device as in claim 7, wherein the sample channel takes the form of a through-hole provided in the substrate to facilitate introduction of sample into the reaction channel.

9. A microfluidic device as in claim 8, wherein the through-hole collects sample when sample is loaded on the through-hole from the external source.

10. A microfluidic system, comprising:
a substrate;
a reaction channel defined on the substrate along which the sample migrates;
a sample channel defined on the substrate from which the sample is introduced into the reaction channel;
a constricted conduit interface in fluid coupling between the reaction channel and sample channel, through which the sample is injected from the sample channel into the reaction channel;
a capillary tube having a first end depositing fluid on the sample-channel, and a second end coupled to at least one of a sample reservoir and an auxiliary buffer reservoir; and
means for delivering sample and buffer to the sample channel via said capillary tube from said at least one of a sample source and an auxiliary buffer reservoir.

11. A microfluidic system as in claim 10, wherein the second end of the capillary tube is supported to access multiple samples in series from multiple sample reservoirs.

12. A method for injecting sample into a reaction channel defined on the substrate of a microfluidic device, comprising the steps of:

defining on the substrate a sample channel from which the sample is introduced into the reaction channel;

defining a constricted conduit interface in fluid coupling between the reaction channel and sample channel, through which the sample is injected from the sample channel into the reaction channel; and

- 5 applying a driving force to injecting the sample from the sample channel into the reaction channel through the constricted conduit.